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Effectiveness of financial incentives in exchange for rural and underserved area return-of-service commitments: systematic review of the literature

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Objective: To evaluate the effectiveness of programs that provide financial incentives to physicians in exchange for a rural or underserved area return-of-service (ROS) commitment.

Methods: Medline and Ovid HealthSTAR databases were searched from 1966 to 2002.

Study selection: The initial search yielded 516 results. Bibliography review yielded additional references. Articles were excluded if they involved financial incentives to change physician behaviours or enhance profit. Ten publications were selected as the highest level of evidence available. The quality of the evidence was low and of limited applicability (1 retrospective and 1 prospective cohort study, the remainder cross-sectional surveys). Three studies were from Canada, 1 from New Zealand, and the remaining 6 were from the United States.

Results: Outcome measures included initial recruitment of physicians, buyout rates and long-term retention. The majority of studies reported effective recruitment despite high buyout rates in some US-based programs. Increasing Canadian tuition and debt among medical students may make these programs attractive. The 1 prospective cohort study on retention showed that physicians who chose voluntarily to go to a rural area were far more likely to stay long term than those who located there as an ROS commitment. Multidimensional programs appeared to be more successful than those relying on financial incentives alone.

Conclusion: ROS programs to rural and underserved areas have achieved their primary goal of short-term recruitment but have had less success with long-term retention. Additional research is needed to examine the cost effectiveness of existing ROS programs and the incorporation of other retention strategies, such as medical education initiatives, community and professional support, differential rural fees and alternate funding models.

Objectif : Évaluer l'efficacité des programmes offrant des incitatifs financiers aux médecins qui s'engagent en contrepartie à une période de service en région rurale ou mal desservie.

Méthodes : Sources de données : On a effectué une recherche dans les bases de données Medline et Ovid HealthSTAR de 1966 à 2002.

Sélection d'études : La première recherche a produit 516 résultats. Une analyse des bibliographies a dégagé d'autres références. On a exclu les articles comportant des incitatifs financiers visant à modifier le comportement des médecins ou à améliorer les profits. On a choisi dix publications au niveau de données probantes le plus élevé disponible. La qualité des données était faible et leur applicabilité, limitée (une étude de cohorte rétrospective et une autre étude de cohorte prospective; enquête transversale dans les autres cas). Il y avait trois études du Canada et une de la Nouvelle-Zélande, et les six autres provenaient des États-Unis.

Résultats : Les mesures de résultats comprenaient le recrutement initial des médecins, les taux de rachat et le maintien à long terme des effectifs. La majorité des études ont

signalé un recrutement efficace en dépit de taux élevés de rachat dans le cas de certains programmes américains. L'augmentation des frais de scolarité et de l'endettement chez les étudiants en médecine au Canada pourrait rendre ces programmes attrayants. La seule étude par cohorte prospective portant sur le maintien des effectifs a montré que les médecins qui s'installent volontairement dans une région rurale étaient beaucoup plus susceptibles d'y demeurer longtemps que ceux qui s'y installent parce qu'ils se sont engagés à un service de contrepartie. Les programmes multidimensionnels semblaient plus fructueux que ceux qui comptaient sur les incitatifs financiers seulement.

Conclusion : Les programmes d'incitatifs financiers en contrepartie du service en région rurale ou mal desservie ont atteint leur but premier, soit de recruter à court terme, mais ils ont connu moins de succès face au maintien à long terme des effectifs. D'autres recherches sont nécessaires pour analyser la rentabilité des programmes actuels d'incitatifs financiers et l'intégration d'autres stratégies de maintien des effectifs, par exemple les initiatives d'éducation médicale, l'appui de la communauté et de la profession, les honoraires ruraux différentiels et d'autres modes de financement.

INTRODUCTION

Nearly one-third of the Canadian population live in rural areas.¹⁻⁴ They are served by just 12.8% of family physicians.⁵ The provision of financial incentives in exchange for a rural or underserved area return-of-service (ROS) commitment is one strategy to address shortages of family physicians in these areas.

The primary goal of ROS programs is to provide short-term rural physician manpower (recruitment). "Buyout options," whereby a physician can pay back funds received with interest and in some cases financial penalties are one way in which the intent can be derailed. Medical students may commit to a contract before their career and family plans have solidified and thus their ability to honour the commitment can change. A secondary goal is to retain physicians past their mandated term (retention). Controversy exists as to whether this is even a realistic goal for these programs.

Medical student debt load is an increasing problem in Canada, and there is concern that this will affect physician demographics or choice of specialty.^{6,7} The United States has more experience with debt load, and it is possible that Canada may learn from ROS programs such as the federal National Health Service Corps (NHSC) and state-based scholarship programs. In New Zealand, debt has been shown to have a strong effect on career decisions, including the decision to leave the country.⁸ Canadian programs such as the Underserved Area Program (UAP) in Ontario and the Rural Physician Action Plan in Alberta have been in existence for many years. The UAP now includes the Free Tuition Program, which was established by the Ontario Ministry of Health and Long-Term Care in

2000 and provides tuition reimbursement subsidies in exchange for an equal number of years' commitment, with a minimum 3-year commitment (www.health.gov.on.ca).

The primary objective of this article is to perform a systematic review of the literature to determine how effective ROS initiatives have been in satisfying the goals of short-term recruitment and long-term retention. A secondary objective is to assist in planning research to evaluate new ROS programs.

METHOD

Data sources

Medline was searched from 1966 to 2002. A detailed description of the search methodology and results can be found in Table 1. Search A combined health manpower, rural health services, delivery of health care, health services research, rural health, hospitals rural, medically underserved area, rural retention and primary health care using the boolean term OR. Search B combined physician incentive plans, training support and incentives reimbursement using OR. The combination of search A and B with AND produced 488 references. The same search criteria were run on Ovid HealthSTAR database, searching from 1975 to July 2002, and 28 additional references were obtained.

Articles were included if they dealt with any form of physician financial support in exchange for restrictions on practice location. Articles were selected from all countries and of all research designs. Randomized controlled trials are logistically very difficult in this area and thus the highest expected level of evidence is from prospective

cohort studies. Articles were excluded if they involved financial incentives to change clinical behaviours, practice patterns or create more profit for a clinic. They were also excluded if they were not applicable to the Canadian health care system.

A total of 516 article abstracts were reviewed, and, following the application of inclusion and exclusion criteria (Table 2), a subset of 50 articles was selected for more detailed full-text review. The full text and bibliographies of this subset were reviewed, and 5 additional references were obtained. The focused nature of the topic and the lack of precise MeSH terms resulted in an imprecise search technique, and a high proportion of articles were excluded. The exclusion criteria applied to the total of 521 articles is outlined in Table 2 along with the number of articles excluded in each category. Ten articles were found to be suitable to include in the systematic review.

RESULTS

This systematic review identified 10 publications that were of sufficient quality and applicability as

outlined in Table 3. Three studies were from Canada,⁹⁻¹¹ one was from New Zealand,⁸ and the remaining 6 were from the United States.¹²⁻¹⁷ The level of existing evidence was low, with only 2 cohort studies, that of Rabinowitz and colleagues¹⁷ and Pathman and coworkers.¹² The remainder were descriptive designs using cross-sectional surveys or publication of incentive program descriptions and data. Of the 6 cross-sectional surveys, 3 surveyed the physician recipients of the incentive, one surveyed medical students, and 2 surveyed the directors of incentive programs.

In 2000, Pathman and colleagues¹⁶ published a 1996 cross-sectional survey of 82 US state-based scholarship programs in operation in 1996 in 41 states. In that year, 1306 US physicians signed contracts with state programs in contrast to 1000 through the NHSC federal program. The NHSC program was created in 1990 and provides medical education scholarships to students in a year-for-year exchange for ROS. This study provides information regarding the initial success with recruitment and describes the overall extent of US-based programs

Table 1. Literature search methodology

Search database / method	MeSH term / criteria	No. of references
Medline 1966 – July 2002		
Search A	Health manpower OR Rural health services OR Delivery of health care OR Medically underserved area OR Professional practice location OR Rural health OR Hospitals, rural OR Primary health care OR Rural retention	69 747 results
Search B	Training support OR Physician incentive plans OR Reimbursement, incentive	5 356 results
	Search A AND Search B	488 results
Ovid HealthSTAR 1975 – July 2002		
Search C		28 results
Total of Searches A&B and C		516 results
Bibliography review		5 results
Results of Searches A, B, C and Bibliography review		521
Abstract review of 521 results	Inclusion / exclusion criteria*	55 selected
Full text review of 55 selected	Inclusion / exclusion criteria*	10 selected
*See Table 2 for definitions of Inclusion and Exclusion criteria.		

at that time. The majority of these programs were uni-dimensional in that they involved financial incentives in isolation.

Pathman and coworkers¹² also published results from a cohort study of 304 rural primary care physicians in 1992. Of these, 36% were serving NHSC ROS commitments. The NHSC and non-NHSC cohorts were surveyed in 1981 and 1990. Initially, 43% of the NHSC cohort stayed past their commitment. Unfortunately, at 8 years, only 29% of NHSC versus 52% of non-NHSC physicians remained in their index practice ($p < 0.001$). Additionally, 80% of NHSC physicians who left their index practice left rural practice altogether. This study was prospective and well done and seems applicable to Canada.

In 2000, Pathman and coworkers published the results of a cross-sectional survey of 468 primary care physicians in the US.¹³ Those with ROS commitments were more likely to practise rurally versus those without (33% vs. 7%, $p < 0.001$). This study is biased by the fact that, by definition, those physicians serving a commitment would have to be in a rural area. The study discussed the balance of negative aspects of debt load such as change in demo-

graphics with the positive influence on rural recruitment through ROS. The tension between these factors will likely be applicable in Canada.

Rabinowitz and colleagues performed a retrospective cohort analysis to evaluate a multi-dimensional program in Pennsylvania that combines selective admission of medical school applicants from rural areas, rural medical education experiences, and loans.¹⁷ This program is unique and has limited applicability because there is no mandatory ROS. Graduates of this program account for 21% of rural family physicians despite representing only 1% of total state graduates. Thirty-four percent of graduates enter rural practice compared with 11% of state graduates. This program offers support for medical schools and residency programs located in northern or rural areas and says little about ROS issues. It is an example of the power of a truly multi-dimensional retention initiative.

UAP data from Ontario was published by Bass and Copeman¹⁰ in 1975, showing that over the first 3 years of the program, 196 physicians were enrolled in the incentive grant program. They were given financial incentive grants over 4 years in exchange

Table 2. Inclusion and exclusion criteria for references

Inclusion criteria	Exclusion criteria	No. excluded
Payments to physicians to promote recruitment or retention	Payments to physicians to change clinical behaviours (e.g., managed care)	111
Payment in form of tuition replacement or direct cash bonus	Housestaff-related issues	96
Program descriptions of financial incentive programs	Physician lifestyles / incomes	82
All countries of origin	Physician manpower in general	49
Prospective or retro-spective cohort studies	Focus on business aspects	34
Cross-sectional surveys	Medical education issues	32
	Editorials	26
	Dental	18
	Nursing	13
	Medical student choice of specialty	12
	Other recruitment tools	11
	Non-English language text	9
	Health promotion	6
	Case studies	3
	Physician productivity	3
	US government lobby efforts	2
	Promotion of research	2
	Pharmacy	1
	Midwives	1
Total no. of articles excluded		511

Table 3. Summary of the literature review						
Study, year published (location)	Type of program	Study type (and period)	N*	Description	Buyout option	Recruitment / Retention
Pathman et al, ¹⁶ 2000 (US)	82 programs in 41 states. Uni-dimensional	Cross-sectional survey (1996)	1306	Survey of existing state-funded programs	Costs to buy out varied; no. of buy outs not evaluated.	Recruitment of physicians in the US in 1996: 1306 state programs, 1000 to NHSC. Shows scope of recruitment that is possible.
Pathman et al, ¹² 1992 (US)	US federal program — NHSC scholarships. Uni-dimensional.	Prospective cohort study (1981–1990)	304	Compared NHSC-funded (36%) to non-NHSC physicians in 1981 and 1990.	Not studied (enrolment after rural practice commenced).	43% of NHSC remained past their service commitment. At 8 years only 29% NHSC vs. 52% non-NHSC remained ($p < 0.001$).
Pathman et al, ¹³ 2000 (US)	Multiple state and federal programs	Cross-sectional survey (1999)	468	Survey of primary care physicians	Not studied.	Physicians with ROS commitments were more likely to practise rurally (33%) than those without (7%) ($p < 0.001$).
Rabinowitz et al, ¹⁷ 1999 (Pennsylvania, US)	PSAP primarily combines selective admissions with educational initiatives and financial aid.	Retrospective cohort study (1978–1991)	206	Graduates of the PSAP compared to non-PSAP peers	N/A. No mandatory return of service.	Graduates account for 21% of rural FPs despite representing only 1% of total state graduates, 34% of graduates practise rurally, 5- to 10-year retention rate 87%. Applicability low as it doesn't mandate ROS.
Bass & Copeman, ¹⁰ 1975 (Ontario)	Ontario UAP	Program data published (1969–1974)	217	Bursary recipients were surveyed.	49 repaid bursary; 55 honoured commitment.	217 student bursaries. Of 19 who finished term, 14 (74%) remained in community short term (as of 1974). Short follow-up / early in UAP history.
Anderson & Rosenberg, ⁹ 1990 (Ontario)	UAP includes yearly \$10 000 tax-free grants, bursary program for ROS, specialist initiatives multidimensional	Descriptive study using physician ratio analysis before/after UAP (1956–1986)	N/A	Location quotients used to examine physician distribution before/after the UAP.	Not evaluated.	Increased numbers of Northern physicians but little improvement in ratios. Limited by indirect method of analysis.
Wilson et al, ¹¹ 1998 (Alberta)	RPAP, multidimensional program, educational, lifestyle initiatives, and SLRP multidimensional	Program data published (1992–1997)	17	Data published regarding participants in the SLRP.	Not stated.	Not evaluated. Low participation has limited effectiveness. Developed in an era of low tuition and debt load.
Navin & Nichols, ¹⁴ 1977 (Arizona, US)	ASEP provides subsidies to Arizona students attending school out of state for ROS to Arizona. Uni-dimensional.	Cross-sectional survey (1975)	143	Survey of past participants in the program	55/143 (38%) chose cash repayment in lieu of ROS.	ROS to state not specified as rural. 67/143 (47%) chose urban; 21/143 (15%) chose rural. Not applicable to Canadian rural or underserved issues.
Strosberg et al, ¹⁵ 1982 (US)	Multiple state programs described. Uni-dimensional.	Cross-sectional survey of programs (1979–1980)	N/A	DHHS surveyed 40 programs in 30 US states.	Overall success was limited by high buyout rates.	80% of programs required ROS; lenient buyout options limited recruitment results. US buyout problems may not be applicable.
Gill et al, ⁸ 2001 (New Zealand)	N/A	Cross-sectional survey (2000)	179	NZ Wellbeing, Intentions, Debt and Experience survey of medical students	N/A	82% of students intended to leave NZ to practise elsewhere within 2 years. 45% noted that student loan repayments would be a very important incentive to stay.

NHSC = National Health Service Corps; ROS = return of service; PSAP = Physician Shortage Area Program; UAP = Underserved Area Program; RPAP = Rural Physician Action Plan; SLRP Student Loan Remission Program; ASEP = Arizona Student Exchange Program; DHHS = Department of Health and Human Services. *No. of study participants.

for settling in a designated underserved area. The student bursary arm of the program enrolled 217 medical students. Of these, 49 students repaid their bursaries and 55 honoured their commitment. Of those 19 who had completed their term, 14 (74%) remained in the community short term. This study is limited by its small numbers and short period of follow-up. It was done very early in the evolution of the UAP and is of limited usefulness.

Anderson and Rosenberg⁹ performed an analysis of the UAP that studied physician ratios before and after the UAP and concluded no improvement in physician distribution. While the absolute number of physicians in Northern Ontario had increased, so had the total physician numbers in Ontario, and distribution ratios had not improved. The authors criticized the program for being uni-dimensional in primarily using financial incentives alone.

Wilson and cohorts¹¹ published data regarding the multi-dimensional program called the Rural Physician Action Plan that was developed in Alberta in 1990. Components included undergraduate and postgraduate medical education experiences, a special skills program and a Student Loan Remission Program. Unfortunately, low participation limited the effectiveness of the student loan component. Applicability is low because tuition fees and debt load were low during the period of study.

Navin and Nichols¹⁴ published data from the Arizona Student Exchange Program. It was set up to provide subsidies to Arizona medical students attending school out of state. In return for subsidies, the students agreed to an ROS in Arizona. Students were not restricted to return to rural practice, and only 15% of the 143 participants chose rural practice. Buyout rates were 38% overall. This study may be applicable to provinces that have lower retention of graduates, however, because it did not mandate rural ROS specifically, conclusions are problematic.

Strosberg and cohorts¹⁵ published a review of multiple US state-based programs in 1982 and concluded that lenient buyout options limited effectiveness. The ability to achieve higher incomes in the US and thus have an increased ability to pay off debt may make this data difficult to apply to the Canadian situation.

In 2001, a survey of New Zealand medical students, published by Gill and colleagues⁸ showed that 45% of respondents listed student loan repayments as being very important with respect to a decision to stay in New Zealand. This proportion exceeded responses to increased salaries and shorter hours. There was significant correlation between

level of debt for a final year student and their opinion regarding loan repayment ($p < 0.01$).

DISCUSSION

Despite extensive experience with ROS-based incentive programs, there has been very little research done regarding their effectiveness. What research has been performed is primarily descriptive and provides a low level of evidence. With an increasing debt load among students it can be predicted that interest in new programs such as the Free Tuition Program in Ontario will increase.

Ideally, measurement of the effectiveness of these programs should be based on a demonstrated improvement in the health of the patient population being served. Due to the small size of incentive programs and the long time interval required, this is impractical. We must rely on secondary markers such as recruitment and retention rates.

By definition, all of these programs achieve the primary goal of short-term recruitment. The only potential obstacles would include lack of interest, as in the Student Loan Remission Program in Alberta, or high buyout rates as evidenced by many US-based programs. Higher potential incomes in the US may allow for easier buyout and may limit extrapolation to Canada.

Concerns do exist regarding ROS programs. First and foremost is the paradox that new, short-term physicians in a community would receive more financial incentives than those who have established long-term practices in the community. The Northern Physician Retention Initiative, which provides Northern Ontario physicians with 4 or more years service with annual financial bonuses, is an attempt to correct this injustice. Differential underserved area fees, broad scope of practice bonuses, or alternate funding models would be other possibilities. An example of this is the new alternate funding plan for smaller hospital emergency department (ED) coverage in Ontario that seems to have alleviated the shortage in many rural EDs. Alternatively, the new Ontario Family Health Network (www.ontariofamilyhealthnetwork.gov.on.ca/english/) initiative proposes to reward broad scope of practice behaviours in addition to changing to a blended fee-for-service and capitation-based system. This program is currently too new to evaluate.

The secondary goal of long-term retention in rural or underserved areas is clearly less well established. The 1992 study from Pathman and coworkers¹² suggests that those who choose to go to rural

areas are far more likely to stay long term than those who go as an ROS commitment. This suggests that those who choose to go have a stronger inherent interest in rural medicine. Those physicians may also have sought out and obtained extra training required to thrive in these areas. This issue may be so important that long-term retention greater than the 29% seen in this US study may not be realistic.

Multi-dimensional programs such as that described by Rabinowitz and colleagues¹⁷ appear to be more successful with respect to retention. Effective retention requires a multi-dimensional model whereby medical schools and residency programs effectively prepare motivated students, hospitals and communities provide professional support, and government rewards rural practitioners with adequate financial compensation for choosing to take on the challenge of rural practice.

This systematic review is limited in its conclusions by the low level of existing evidence in this area. The US focus of the literature is also a bias in that traditionally US students carried immense debt but also had the opportunity for higher incomes than in Canada. Finally, many of the Canadian programs in existence are too new to study their effectiveness.

CONCLUSION

Programs offering financial incentives in exchange for ROS commitments to rural or underserved areas have achieved their primary goal of short-term recruitment. In the US, lenient buyout opportunities have reduced effectiveness. In the absence of a multi-dimensional approach, these programs have had less success with respect to long-term retention. New and existing Canadian programs should be studied prospectively to examine cost effectiveness and incorporation of other modalities

such as medical education initiatives, differential fees, community and professional support, and alternate funding models.

Competing interests: None declared.

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